
GRITH

Strategies and action plans jointly developed

Knowledge pool: Energy SWOT

Co-created pool of knowledge about the Energy Strengths, Weaknesses, Opportunities and Threats of industrial sites, their businesses, their organisation, (public) support and their individual and local/regional economic, environmental and social impact .

It will be available online through a tool that also connects to existing knowledge and policy in the field of industrial energy transition.

Report #3

Status: achieved

1. Why an Energy SWOT
2. Who owns the problem and the solutions?
3. Analyzing Strengths & Weaknesses
4. Opportunities & Threats
5. Mapping for knowledge & engagement

Energy SWOT

Industrial sites are the sleeping beauties of the energy transition. How can we wake them up in the most effective way? How to help them see their opportunities but also threats? And how can we give them the agency to act on these?

User-based approach: (self-)understanding

The GRITH project believes in a user-based approach. In order to help industrial sites – both in their energy transition and economic development - we need to understand their perspective, empathize and encourage a clearer understanding of their own situation.

Supporting their own understanding is especially important, since many industrial sites have only a partial view of their energy strengths and weaknesses, of the opportunities available and the potential threats.

Shared analysis

Taking inventory and analyzing these strengths and weaknesses, opportunities and threats is the first step towards a better understanding, both by us as supporting organizations and by the industrial sites themselves. Therefore, the GRITH consortium's work with industrial sites starts with an Energy SWOT, conducted together with the industrial sites. Shared analysis is the start of working together on the site's next steps towards renewable energy and increased energy efficiency.

Toolbox and knowledge pool

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As a part of the Energy SWOT, GRITH uses a toolbox and elements from the project's knowledge pool. From instruments for analysis, presentation of data, to strategy development, best (and meaningful, less good) practices, and available technical solutions.

Global, European, national and regional challenge

The need for the energy transition and the drive for economic development are not limited to industrial sites. The energy transition is a global, European, national and regional ambition. Everyone facing the challenges involved with this transition is increasingly aware of how the environment, economy, and society are interconnected. Here, we're all looking for ways to move forward, without leaving regions, businesses and communities behind and without first-mover disadvantages.

Nuisance or incentive for development

European, national and regional regulations are in place to push the energy transition forward and create a level playing field. From a user's perspective, that of a business or industrial site, these regulations can initially be considered more of a nuisance than an incentive for development and growth. This viewpoint is also a barrier to our regional work with industrial sites regarding energy transition. If we want to support sites and businesses, it doesn't help to be seen as the authority that makes life and business difficult. Also, while informing the project's target group about new or adapted legislation, we must avoid the image of 'The Messenger'/bearer of bad news.

Who owns the problem?

Clearly, in the fight against climate change the energy transition is necessary from a global perspective. However, GRITH believes that the energy transition is also good for economic development and in most cases, good for business, especially for businesses willing (and able) to adopt a mid- and long-term perspective. A shared energy SWOT helps to make businesses aware of how the energy transition can be an opportunity and that the greatest threat is to do nothing.

Provide perspective and agency

We want to communicate that the energy transition is an opportunity, that doing nothing is not an option, without being the bearer of bad news. So, in all our GRITH work with industrial sites we're focused on providing sites and businesses with perspective, with the agency to act on opportunities, to increase strength, to reduce weaknesses and to mitigate threats.

Input for Energy SWOT

The interconnectedness of businesses, industrial sites, regional development, national and European goals, makes it crucial to create our GRITH energy SWOT based on insights into regional, national and European developments as well as on data on the energy consumption (and emissions) of businesses and their industrial sites. For the former GRITH has collected

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information on price development plus current and possible future regulations, using this to create scenario's for a particular, site-based Energy SWOT.

Data collection for sites

The data on energy consumption needs to be shared by the sites and businesses based there. Some of this data is already collected by relevant authorities. If not obliged by law, some businesses and sites may be hesitant to share data that could be confidential. For each situation, GRITH partners investigate with these sites how to take these concerns into account.

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Energy Strategy Toolbox

Start with diagnosis: collect data on 3 levels:

1. Primary energy and MWh: MWh of fuel, coal, wind, nuclear, natural gas
2. Transformation(s) of the energy and MWh: for example MWh solar to MWh of electricity
3. Usage of MWh: building, utilities, processes, transport, losses.

Present the data in a Sankey Diagram: a flow diagram that emphasizes flow/movement/change from one state to another, in this case from one type of energy to another. The main focus of the Sankey Diagram is firstly on the total energy consumption. A carbon diagram would require a translation. GRITH partner Pôlénergie has also made this carbon Sankey diagram, highlighting that natural gas and coal are the two main sources that need to be 'tackled'. GRITH partner Emmen has developed a Sankey diagram for the whole municipality.

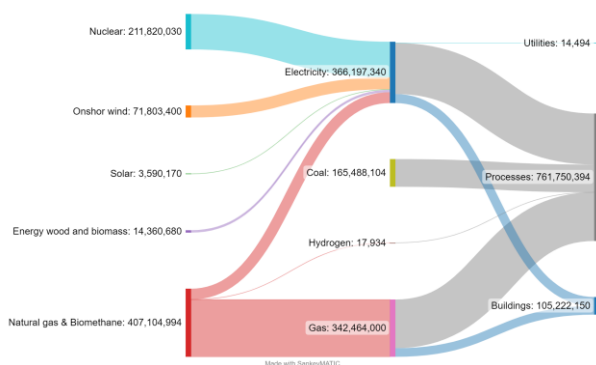


Figure 1 Polenergy Sankey Diagram for the Isbergues Industrial Site

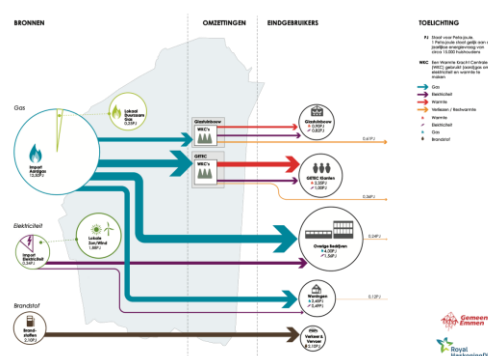


Figure 2 Emmen Sankey Diagram for the whole municipality

Based on the Sankey Diagram, the energy flows can be translated to CO2 emissions. This insight in the carbon footprint helps to identify where and which measure will lead to the

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largest effect in reducing this carbon footprint. For industrial processes, heat is often responsible for the highest emission. In these cases, process heat should be the priority for an action plan.

Guide for Energy Neutral Business Parks

GRITH partner Drenthe developed a guide for energy neutral business parks and industrial sites. The guide is a useful supplement and follow-up to the data collection mentioned previously. The guide also looks at physical characteristics and organizational structure (step 2).

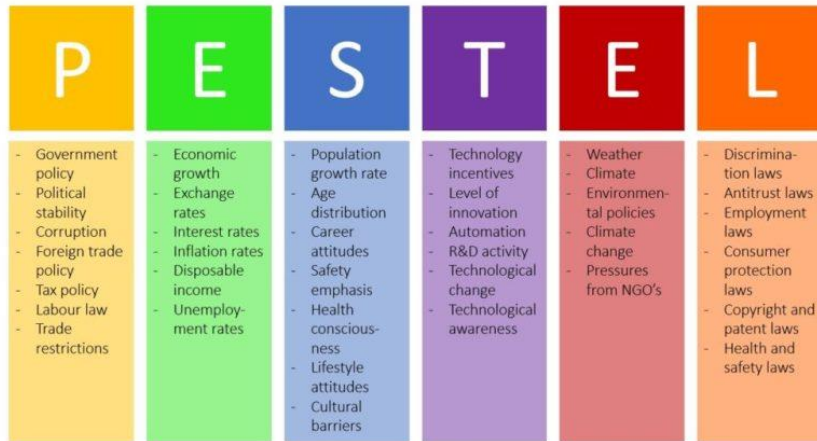
Step 1 Global Exploration	Step 2 Mapping out The starting Situation	Step 3 Identifying Opportunities	Step 4 Implementation plan for projects and collaborations	Step 5 Implementing and safeguarding plans
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<p>Step 2 Mapping out the starting situation</p> <p>Physical characteristics</p> <p>2.0 Demarcation of the planning area</p> <p>2.1 Business Park – Industrial Site</p> <p>2.2 Buildings</p> <p>2.3 Capacity</p> <p>Social characteristics</p> <p>2.4 Stakeholders</p> <p>2.5 Form the organization and types of consultation</p>

PESTEL: Outside influences & incentives

GRITH partner Vejle works with the PESTEL model to identify outside influences on and incentives for industrial sites. PESTEL is a framework to assess macro environmental aspects of energy consumption: political, environmental, social, technical, economic & legal.

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Threats and Opportunities

The GRITH focus is on opportunities related to the threat of high carbon emissions and high (volatile) energy prices. These opportunities to increase energy efficiency and to switch to (renewable) energy sources with lower carbon emissions can be realized through different solutions. Every solution for decarbonization needs to be tailor made.

Guide for Energy Neutral Business Parks

GRITH partner Drenthe developed a guide for energy neutral business parks and industrial sites. The guide is a useful supplement and follow-up to the data collection, characteristics mapped and PESTEL influences identified. Step 3 of the guide identifies opportunities:

Step 1 Global Exploration	Step 2 Mapping out The starting Situation	Step 3 Identifying Opportunities	Step 4 Implementation plan for projects and collaborations	Step 5 Implementing and safeguarding plans
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Step 3 is about establishing cooperation, involving business owners and stakeholders and jointly identifying sustainability opportunities. Here it is important - based on the picture formed of the business park in the first steps - to closely involve individual companies. This can be done by holding discussions, organizing meetings or a round of phone calls. This phase also reveals opportunities for partnerships and any associated risks. In addition, concrete ideas and solutions are identified and, where possible, appointed to project ideas.

<p>Step 3 Identifying Opportunities</p> <p>3.1 Kick-off meeting</p> <p>3.2 Individual opportunities and ambitions per business</p> <p>3.2 .a Discussion round 1: Collecting relevant data</p> <p>3.2 .b Discussion round 2: Concretize</p>
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3.3 Translating opportunities

Flemish EHUB-BT study

In Mechelen the Energy SWOT was informed by the Flemish EHUB-BT study. In 2021 the Flemish Department of Environment and Spatial Development published an exploratory study on the EHUB-BT concept: Energyhubs on Industrial Sites. Together with the study, the Flemish government developed a work methodology to assess the potential of an industrial park becoming an energy hub, including suggestions on organizational structure. City of Mechelen works with this tool on Mechelen North, provide a translated version of the study and methodology and will disseminate this to the other project partners.

An EHUB-BT is a system consisting of a geographical area in which the energy demand and supply of at least one industrial site and one nearby consumer are matched through multi-carrier energy system (energy conversion, storage and network technologies) with local control, structural collaboration and active support of the energy transition. The EHUB-BT study recognizes three types of hubs:

- Switchhub: the industrial site has a strategic position in the regional energy ecosystem creates a huge potential for large-scale energy sharing, distribution and storage of one or more energy carriers.
- Heathub: the focus is on capture of rest-heat on and around the industrial site
- Energyhub: a large potential for the production of renewable energy including local storage.

Quares, one of the enterprises based on the Mechelen North industrial site, participated in the Flemish EHUB-BT study and is now involved in how the building blocks of the EHUB-BT model can be implemented here: Energy Demand, Energy Supply, Flexibility & Network, Incentive & Collaboration. Mechelen works on developing Mechelen North into a Switchhub.

Flemish EHUB-BT typology

Building Block	Elements	Heathub	Switchhub	Energyhub
Demand	Energy intensive enterprises	1	1	2
	Regional collective heat consumption			
	Onsite heat consumption			
	Transregional infrastructure	1	1	2
	Onsite electricity consumption	1	0	2
	Regional electricity consumption			
	Development potential	1	1	2
Supply	Waste-heat	2	0	1
	Wind energy	0	2	1

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	Solar energy			
Flexibility & Network	Transregional infrastructure Distribution stations	0	2	1
	Underground energy storage Electricity storage through cold stores or V2G	0	1	2
	Transregional infrastructure	0	1	2
Incentive & Collaboration	Organizational structures	1	1	1
	Asset ownership			
	Grounds ownership			

0	Not relevant or below threshold
1	On threshold
2	High potential, above threshold

Local Organizations as (potential) change agents

GRITH partner Borås works closely with the association, "Viareds Företagsförening, VFF", that in a voluntary way organises companies / members around topics like safety, roads, parking, public transports, services etc. on the Viared Industrial Site. Based on this experience Borås has identified the following tips:

1. If possible, work together with a Company Associations in the area. It makes the work easier in terms of communication, awareness raising and reaching a point of Common Interests among the companies.
2. Be generous with information regarding the aim of the project is, what work is needed to proceed and what their participation entails, in order to raise members' interest and support. The association must understand the advantages - "what's in it for me/for the members" - before they commit to further communication.
3. Be well prepared before approaching the Association or companies, respect their time and efforts. This is particularly valid in the Swedish case where such activities are above and beyond the normal work brief.
4. Raise interests in steps, keeping future plans in mind. Also be aware that companies all have different starting points when it comes to the challenges and possibilities of an energy transition.
5. Connect and team up with different competences to create a broad knowledge input and develop the next steps.

Summary of SWOT Analysis – Viared

<p>Strengths</p> <ul style="list-style-type: none"> • Large solar energy potential (> 850,000 m²) • Collaboration and funding • Local focus • Existing structure for cooperation • Modern buildings • Climate data and technical modeling 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Regulatory barriers • Shared incentives • Roof limitations • Grid capacity • Economic uncertainties
<p>Opportunities</p> <ul style="list-style-type: none"> • Development of energy communities • Innovative solutions • Green strategies • Technological advancements • Increased electricity demand and electrification • EU support for energy communities 	<p>Threats</p> <ul style="list-style-type: none"> • Regulatory changes • Market instability • Grid capacity shortages • Resource competition • Technical risks • Lack of cooperation

Interreg North Sea Co-funded by the European Union
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Best Practice from Drenthe: IBDO Business Advisors drive energy transition

In Drenthe as in other regions, one of the weaknesses identified is the lack of trust between enterprises and authorities. This affects the energy transition. To overcome this challenge, Drenthe together with its municipalities developed the support program and expert pool IBDO: Ik Ben Drents Ondernemer – I'm an entrepreneur from Drenthe.

The experts from IBDO are often entrepreneurs themselves and thus ideally based to build a relationship with the enterprises they advise, based on a common understanding. The IBDO advisor with the highest conversion rate is also the owner a recreation park. Speaking the same language helps the IBDO advisors to support the large group of small and medium sized enterprises from Drenthe on topics such as innovation, digitalization and energy transition. A practical tip from the business advisors is never to leave a conversion without a next appointment, to follow up on the advice given, on the trusted relationship in the making.

Key element in the energy advice by the IBDO business advisors is the approach of collective demand: organizing shared demand for renewable energy, energy efficiency technology and investments. Here industrial sites are the logical starting point. However, there is also much interest in sector-organization, bundling enterprises throughout the province active in the same sector and facing the same challenges.

In addition to collective, industrial site or sector solutions, IBDO advisors also support enterprises with individual solutions, tailored to the specific needs and potential of businesses. In both cases a positive business case is crucial. Without a positive business case the small and medium sized enterprises reached by IBDO advisors are not likely to follow up and move forward with their energy transition. Interestingly is that although many enterprises expect that their business case would be negative without subsidies, the actual case is positive, with lower energy costs and a sound return on investment.

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Shared Lobbying as method for coalition building and shared SWOT analysis

GRITH partner Wesermarsch started their efforts in the energy transition of industrial companies – in reaction to a call of these companies – by helping them organize, coordinate and connect their activities in energy transition. Wesermarsch used a more bottom-up approach.

There were a few first-enablers who felt a certain pressure to act because of external effects – the EU Green Deal, the war in Ukraine and the resulting impacts on energy supply and prices.

Some industrial companies had already started several internal projects to reduce energy costs or manage energy consumption in a more sustainable way. However, they soon realized that demands exceeded their individual capacities, including –the energy infrastructure of their sites.

As a result, a couple of first-movers reached out to Wirtschaftsförderung to help get connected with other companies and energy providers, and/or get connected with local communities. Through the efforts of Wirtschaftsförderung, a cluster was formed with different stakeholders in the local energy transition consisting of partners from administration, economy and infrastructure providers.

The Wirtschaftsförderung supplies a platform for several stakeholders in the energy transition by organizing meetings, inviting new partners, keeping in touch with local municipalities and functioning as a contact point for questions and project ideas. By spreading the message and scaling up communication efforts, the partner aims to surpass the local limits.

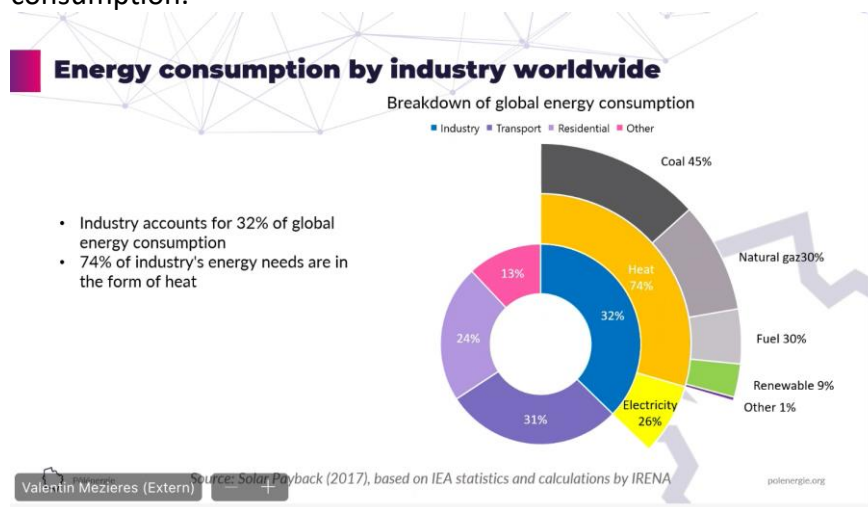
GRITH partner Pôlénergie advises 5 steps:

1. Initial situation: create an overview of installations and regular monitoring of consumption.
2. Energy sobriety: reduce energy requirements to what's necessary only.

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3. Energy efficiency: optimize energy consumption
4. Energy mix: change the energy mix to decarbonize the process
5. Renewable energy: integrate renewable energy to the energy mix.

It is really important to start with questioning the usage. Oversizing energy installations will lead to overconsumption, wasted energy and higher bills. It is crucial to start with energy efficiency. It's difficult to prioritize your actions, which is why it's so important to measure consumption.



74% of the industry's energy needs are in the form of heat. Heat is the main requirement for the industrial sector. Modify the process (e.g. lower the process heat temperature), optimize the process (e.g. equipment performance), exploit waste heat. Of the 30% of electricity consumed, much is used for electric motors (in the production process): here there's room for optimizing electricity use.

Energy efficiency

The optimization of energy consumption should focus on reducing energy losses, by increasing the efficiency of processes, improving insulation and re-using waste energy. Here - and when it comes to implementing renewable energy sources on site – vertical integration is an important strategy.

Energy mix:

Electrification: choose the electricity sources with the lowest carbon footprint. Electricity production and consumption might not be balanced. For electrification it is important to know what capacity the national network has to supply the electricity and face peak demand.

Hydrogen: there is a large demand but, as yet, there's insufficient supply of green hydrogen. Hydrogen is produced through electrolyzes. This process has a relatively low energy efficiency whereby 30% to 45% of electricity is lost. Depending on how hydrogen is used more energy can be lost.

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Renewable energy that can be used in industry:

- Solar thermal: simple source, but high capital investment, land use, and low temperature heat. Preheating is very interesting
- Solar photovoltaic. Competitive, but depending on sunshine, variable, large area.
- Biomass: lots of biomass sources (a great deal of competition with other goals and land uses) many uses for biomass. High temperature is possible, potentially continuous, limited resource, significant storage space.
- Geothermal: like a heat pump with a stable external source. Produces heat and cold (big advantage) high performance, high capital-expenditure, a lot of land for geothermal probes, low temperatures.
- Windturbine
- Nuclear: From the French perspective a potential game changer, especially when small modular reactors are available as they have a number of advantages.
- Aqua thermal: heat and cooling from rivers, mentioned by GRITH partner Mechelen and not yet considered in France. Aqua thermal is the same technology as a heat pump but with a different source.
- Carbon Capture: Carbon storage is not the answer to every problem. Carbon reuse is potentially very interesting, but also complex.

Overall, it is good to note that there is not one clear solution. Renewable energies are part of the solution – you cannot rely on a single solution.

An Energy Management System is crucial: businesses and industrial sites need data, both to become more energy efficient and to apply for subsidies.